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ABSTRACT

Criteria for relevant classroom assessments are discussed, and a biofunctional model of learning assessment is presented. In classroom assessment, the following criteria must be considered: (1) assessment approach (process-oriented and outcome-oriented); (2) assessment context (knowledge and higher-order thinking skills); (3) assessment method (paper and pencil tests and performance assessments); and (4) assessment form (objective and subjective). Distinctions among these criteria are important in describing the array of assessment alternatives. The biofunctional model of learning clarifies how the brain engages in double-activity functioning. It assumes that learners have external (stimulus-regulated), dynamic (subsystem-regulated), and active (person-regulated) sources of control that regulate intellectual activity in the nervous system. Level of learning is defined in terms of the extent of simultaneous involvement of control and learning processes. Using this model, A. Iran-Nejad, B. Chissom, and J. Burry (1989) have suggested a biofunctional model of learning assessment, proposing that active synthesis is an unspecified function of the interaction between active control and dynamic control. The biofunctional model can open a new perspective for distinguishing between what is relevant and irrelevant in classroom assessments. (SLD)

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Assessment of Relevant Learning Processes

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The vast majority of existing standardized achievement tests have long been used to classify students and to evaluate educational programs in the school. For the purposes of accountability and instructional improvement, the tests seldom give learners direct and adequate information. Therefore, educators and critics have raised questions about the educational relevance of standardized tests in the classroom (Airasian, Kellaghan, Madaus, & Pedulla, 1977; Stiggins & Bridgeford, 1985; Stiggins, Griswold, & Wikelund, 1989). Such criticisms can be specifically divided into at least three central areas: theoretical model, content, and method. First, the measurement assumptions of standardized tests rely on models based on theories of stable individual differences (Baker, Freeman, & Clayton, 1991). These instruments give information about the relative position of individuals and school districts compared to other individuals or school districts, but they don't tell us who has changed in ability to perform particular tasks at described levels of expertise.

Second, the issue of irrelevant content is related to the concern about the content-curriculum mismatch and the limited number of educational objectives. The mismatch means that certain topics that are unrelated in the classroom will be included on the test. On the other hand, topics emphasized in teaching can be superficially measured and only a limited number of educational objectives can be covered in the standardized tests.

The third criticism is that the standardized tests focus on measuring the ability to recognize knowledge rather than the ability to think and solve the problems. This criticism stems from the notion that multiple-choice test items have some limitations in measuring higher-order thinking skills and their use can be overemphasized.

The Relevance of Classroom Assessment

The classroom assessments of student achievement play an important role in the teaching-learning processes. Through the use of relevant classroom assessments, teachers can lead to effective

mastery of student learning. On the contrary, insufficient and irrelevant classroom assessments may be of great harm to students. We know that the quality of instruction is closely related to the teachers' understanding of their students' strengths and weaknesses. Therefore, all teachers must understand the differences between relevant and irrelevant classroom assessments because teachers are asked to conduct all of the assessments in their daily teaching practices.

To pursue high quality classroom assessment, some researchers have suggested several criteria which identify and judge the elements of relevant classroom assessments (Baron, 1987; Stiggins, 1992). In this paper, four criteria for relevant classroom assessments will be discussed: (a) assessment approach (process-oriented and outcome-oriented), (b) assessment content (knowledge and higher-order thinking skills), (c) assessment method (paper-pencil test and performance assessment), and (d) assessment form (objective and subjective).

First, the distinction between outcome-oriented and process-oriented assessment is important in that it serves different purposes required for accountability and instructional improvement. Outcome-oriented assessments focus on what the students produce--- test scores and learning outcomes. In a process-oriented assessment approach, what a student knows and how a student structures and processes knowledge is of interest. The process-oriented assessment approach holds the promise of being more useful for diagnosing subject-matter learning difficulties and for prescribing instruction to improve learning and performance (Lane, 1989). Both types of assessments are important as teachers not only want to diagnose students' needs individually and in groups, but also want to gather information for decisions such as grading, grouping, and measuring achievement.

Second, the distinction between knowledge and higher-order thinking skills is also needed in that it maintains the balance between overemphasized simple facts and neglected higher-order thinking skills. Bloom's taxonomy can serve as a conceptualization of higher-order thinking skills (Ennis, 1985). Many educators believe that the top three levels of Bloom's taxonomy (analysis, synthesis,

and evaluation) and the next two lower levels (comprehension and application) are the higher-order thinking skills. As Weinstein and Meyer (1991) have indicated, many different educational tasks require simple recall, particularly tasks in the lower grades and in introductory courses. Both types of assessments are needed since the high-level learning, such as holistic and thematic knowledge is necessary as a context for learning the simple facts or knowledge in many learning tasks.

Third, the distinction between paper-pencil tests and performance assessments is important in that it serves not as an alternative method but as a complementary tool to pursue high quality classroom assessments. Certainly, paper and pencil instruments contribute an important role in classroom assessments (Stiggins, 1992). Even though performance assessments have several problems such as validity, reliability, high cost, and administrative feasibility, they have the potential to measure important objectives that cannot be easily measured by paper and pencil tests (Mehrens, 1992). If we can select the proper assessment methods in classroom assessment, both assessment methods can be used to improve the quality of classroom instruction.

Finally, the distinction between objective and subjective assessment is crucial because it allows us to describe the extremely broad array of assessment alternatives. Objective assessments judge the quality of the response as acceptable or not, right or wrong, all or none. Subjective assessments, on the other hand, rely on the professional judgement of the teacher to evaluate the student's response along a continuum of performance (Stiggins, 1992).

A Biofunctional Model of Learning Assessment

The biofunctional model of learning clarifies how the brain engages in double-activity functioning (DAF) and uses three sources of control to regulate ongoing brain activity (OBA) and momentary constellation firing (MCF) interaction. The model assumes that learners have three sources of control: external (or stimulus-regulated), dynamic (or subsystem-regulated), and active (or

person-regulated) self- regulation. The three sources of control regulate intellectual activity in the nervous system by creating, changing, and recreating knowledge. They are mediated by interest/anxiety (dynamic control factors), intention/effort (active control factors), and external stimulation (external control factors) (Iran-Nejad & Cecil,1992). In the biofunctional model, the learning processes are attention, inquiry, closure, combination, knowledge creation, and metacognition. The level of learning is defined, not in terms of some hierarchical structure of concepts or schema, but in terms of the extent of simultaneous involvement of control and learning processes.

Based on this learning model, Iran-Nejad, Chissom, and Burry (1989) have suggested a biofunctional model of learning assessment. Their learning assessment model implies that what might be called active synthesis (AS) is some unspecified function of the interaction between active control (AC) and dynamic control (DC): AS = f (AC, DC). They have demonstrated the flexibility of prose comprehension as an assessment tool. For example, the item stem can be a paragraph representing more extensive thematic knowledge. Subsequent responses may be designed to measure the learning processes involved in the creation of thematic and other types of knowledge.

The Relevant Classroom Assessments of Learning Processes

Given what you know about how the nervous system functions, what major features of the relevant classroom assessments will you relate to the basic assumptions of a biofunctional model? We can find some features of the relevant classroom assessments related to the learners' internal self-regulation of a biofunctional model. The cognitive theories of how the nervous system functions focus on the learners themselves. In other words, the students learn most successfully when they are actively and dynamically involved in the learning process, including the testing situation.

In a multiple-choice test, students choose the correct answers by external self-regulation such

as information provided in the stem and options, active self-regulation such as prior knowledge resident in the learner, and dynamic self-regulation such as postdiction on their expected correct answers. In a well-built item, the stem and its correct option can be related by postdiction which will cause a louder than usual click of comprehension in the student who knows its answer. This click of comprehension, however, could not be there, if all the items measured were only what the student has already memorized. Prior knowledge has played an important role in the test. The influence of prior knowledge on subsequent learning is often described as a prediction-based process (Iran-Nejad,1990), consisting of a spreading-activation network and active control component (Iran-Nejad & Cecil, 1992). Learning as reconceptualization of prior knowledge requires that we take into account the postdiction process, where previously learned knowledge can be spontaneously reinterpreted with the benefit of hindsight. The biofunctional model implies that both an expected correct option and would-be incorrect options are a function of the difficulty of the figure-ground interaction: the more similar the figure (multiple-choice alternatives) to the ground (the theme in the stem), the harder must the brain's self-regulation processes work to make the correct option stand out for choice as a figure in the context of the ground.

In case of essay tests, students also can write their answers by using three sources of control like multiple-choice tests. Even though these two types of tests need similar biofunctional activities, the essay type tests may require more complex intellectual activities in the nervous system than the multiple-choice tests. For example, more subsystems and microsystems will be involved and more sources at a given moment will be operating in making the better discussion of essay test items.

In conclusion, the biofunctional model can open a new perspective for distinguishing between what is relevant and irrelevant in classroom assessments. The biofunctional perspective will highlight the hidden strength of the assessment of the learning process in that it can clearly analyze the internal self-regulation process of the learners in a self-regulated learning and testing environment. Some

information about how the nervous system functions is useful in identifying and assessing relevant learning processes. First, the biofunctional model is more useful and appropriate for the purpose of process-oriented assessment than outcome-oriented assessment. The model assumes that successful learning occurs when students are actively and dynamically involved in the learning process. This assumption can be applied directly to a specific testing situation. The model also is useful for diagnosing students' learning difficulties and for prescribing instruction to improve learning and performance.

Second, the biofunctional model has useful functions in assessing higher-level learning. According to this model, the level of learning can be measured by the extent of simultaneous involvement of learner control and the learning process. The model implies that at a given moment, more sources and subsystems are involved in the learner's brain system. For example, the prose comprehension as an assessment tool (Iran-Nejad, Chissom, & Burry, 1989) can be shown to measure the learning process involved in the creation of thematic knowledge which is the highest level of knowledge and is controlled by the internal dynamic factors of the learner.

Third, the biofunctional model has suggested some implications in writing objective multiple-choice test items as well as subjective essay test items. Writing test items, we can use some ideas on postdiction processes. We can take into account the postdiction processes, where previously learned knowledge can be spontaneously reinterpreted with the benefit of hindsight.

Finally, the relevant assessment of the learning process based on the biofunctional model is necessary for an unbiased, complementary, or balanced approach in the above suggested four criteria: (a) process-oriented and outcome-oriented assessment, (b) knowledge and higher-order thinking skills assessment, (c) paper-pencil test and performance assessment, and (d) objective and subjective assessment.

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